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HOW SPECIFIC FEDERAL POLICIES MAY IMPACT ON PRAIRIE SOIL AND MOISTURE CONSERVATION

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The list of reports on this subject are as follows:

1. Agricultural Land Degradation in Western Canada: A Physical and Economic Overview

2. Prairie Agricultural Development Directions

3. How Specific Federal Policies May Impact on Prairie Soil and Moisture Conservation

4. United States Department of Agriculture Soil Conservation Activities on the U.S. Great Plains: Lessons for Agriculture Canada on the Canadian Prairies

5. Impacts and Program Delivery Aspects of Current Activities to Prevent Soil Degradation and Conserve and Improve Soil and Water Resources for Agriculture - Key Findings and Overview of Programs

6. An Overview of the Technology Transfer Systems for Soil and Water Conservation Practices in Western Canada and The United States

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Executive Summary

This report examines the possible impacts on prairie soil and moisture conservation of Federal Government policies related to transport, feedgrains, trade, grain marketing quotas, credit, taxation, income stabilization, crop insurance and energy conservation. The principal concern is how these policies impact on the degree of wind and water erosion, salinization and soil acidification through influencing producers' decisions concerning the amount of summerfallow used, the degree to which minimum tillage can be introduced, the types of crops which are grown, and the ratio of livestock to crop production on the prairies.

To date, there has not been sufficient research to quantitatively determine the impact of these different policies; however, there is adequate information to make some general conclusions concerning their relative importance and also to advance recommendations concerning how they can be altered to foster better conservation practices. The policy recommendations listed in the conclusions serve to summarize the observations which can be made with the information which is currently available. They are also intended to serve as the basis for the future research in this area which is needed to develop more definitive and administratively feasible recommendations for future consideration.

The areas in which there appears to be the most potential for influencing prairie soil conservation include:

1. Transportation policy, particularly the method by which producers are to be compensated for changes in the Crows Nest rate structure.

2. Grain marketing quotas, particularly features of that policy which encourage more breaking and fallowing of land.

3. Credit and taxation policies which could be used to encourage the purchase of equipment for minimum tillage and offer economic incentives to adopt soil conservation practices.

4. Crop insurance policies which could be altered to provide greater assurance to those adopting crop rotations which reduce summerfallow use and thus enhance soil and moisture conservation.

Although the above government policies can have some impact on practices important to soil conservation, they are just some of the many factors influencing prairie producers. There is a good basis to believe that, in fact, the development and dissemination of better technology to foster conservation and price movements in international grain and livestock markets may have a greater influence than many of policies considered. Further research is required to determine how important these policies actually are and also to estimate the relative benefits which could result from future improvements in them.

HOW SPECIFIC FEDERAL POLICIES MAY INDIRECTLY IMPACT ON SOIL AND MOSITURE CONSERVATION

Federal policies related to the transporting and marketing of grain, farm finance and taxation, and also crop and income insurance may all impact on what the prairie agricultural sector produces and what production practices are adopted. The types of products and cropping practices, in turn, influence the rate at which soil deteriorates through wind and water erosion, acidification and salinization.

This paper will examine research which is currently available in an attempt to develop, firstly, a perspective on the influence of agricultural activity on the rate of soil degradation, and, secondly, an understanding of the impacts which government policies may have on those agricultural activities. The conclusions will formulate policy recommendations and identify areas for future research.

Effect of Agricultural Activity on Soils:

There are two basic concerns on how agricultural activity impacts on the rate of soil deterioration: what methods are employed in production and what it is that is produced. In regard to what methods are employed, the two principal ones of concern are summerfallowing and minimum tillage. The extensive use of summerfallowing on the Canadian prairies leaves a considerable area of land exposed to wind and water erosion without any protective vegetative cover. Summerfallowing may also prove to be a significant factor in permitting the underground movement of water which, in turn, results in saline seeps and the salinization of soils. Minimum tillage, the second practice of concern, is positive in its impact as it reduces the amount of soil disturbed during cultivation, thus reducing its susceptibility to wind and water erosion.

There are a few studies which have attempted to quantitatively measure the impact on the rate of soil degradation of both the practice of reducing summerfallow in crop rotations and minimum tillage. The actual quantitative estimates of the degree to which soil erosion is affected by these practices is specific only to the location in which the experiment was conducted; however, there does appear to be a fairly widely held consensus among pedologists that both minimum tillage and more intensive crop rotations do reduce the rate of erosion[1]. Currently, there is work being done by Agriculture Canada in adapting the Universal Soil Loss Equation to the Canadian prairies. Although this equation provides only an approximate estimate, it potentially could be quite useful in assessing the general impact of different cropping practices on soil conservation throughout the region.

The second concern of how agricultural activity impacts on soil conservation relates to what it is that the prairie agricultural sector produces. Soil degradation can be influenced indirectly both by the proportion of crop to livestock production, and also by the varieties of crops grown. Generally, if there is relatively more livestock, more land can be retained as pasture or used to produce forage crops. This leaves the land less exposed to wind and water erosion and also reduces the degree of water runoff which can cause soil salinization. The second concern related to what is produced involves the types of crops grown. Soil conservation can be enhanced through the more extensive use of crops, such as winter wheat, which leave a vegetative cover on the soil over the winter months, and thus serve

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1 Refer particularly to submissions to the Prairie Production Symposium, Saskatoon (1980) by D. Rennie, and by Campbell and Brederbeck. Also, refer to the paper "Land Degradation and Soil Conservation Issues", (1982) by the Prairie Farm Rehabilitation Administration.

to prevent wind and water erosion in the early spring. In addition, some so-called "specialty" crops can be of benefit to the soil by increasing its nitrogen content and thus increase the number of years in which crops can be grown before the land must be summerfallowed. Some specialty crops can also better adapt to adverse soil conditions and thus provide a better vegetative cover for soils which would not produce significant quantities of grain.

In conclusion, the principal means by which agricultural activity impacts on soil conservation is through what production methods are used and through what is produced. Quantitative estimates of the actual impact which these have on soil conservation are available only for very specific circumstances and no general mathematical relationships have yet been developed. Current work by Agriculture Canada in adapting the Universal Soil Loss Equation to the Canadian prairies could prove to be useful in this regard; however, at the moment, the basic conclusion that can be made is that soil conservation would benefit from reduced summerfallow (or lengthened crop rotations), increased use of minimum tillage, an increase in the proportion of livestock produced or an increase in specialty crop production. Government policies which encourage or inhibit the adoption of such practices will, therefore, indirectly impact on soil conservation.

Impact of Federal Policies on Agricultural Practices:

The extent to which producers will adopt practices which facilitate soil conservation will depend primarily on the markets for agricultural commodities, the availability of appropriate technologies and the extent to which information regarding these technologies has been disseminated. By

comparison, the federal policies considered in this section have an impact which is more indirect. In most cases, it is very difficult to isolate the precise effects of the policies themselves and very little primary research has been done in this area. Despite this difficulty, it is possible to describe what is currently known which may be relevant for future work, and also conceptualize the framework for any future analysis.

Some of the policies which will be considered will impact directly on production practices, while others influence such practices indirectly by affecting the market for particular commodities. Before describing the factors to consider in analyzing each policy, it is important to examine how grain prices and volumes of grain marketed will affect production practices relevant to soil conservation. The primary influence which prices will have is on the relative advantage of employing less summerfallow in a crop rotation. Summerfallow is generally adopted to increase the moisture content of the soil in one year for use on the next year's crop. Yields on land which has been summerfallowed the previous year are generally higher than land which has been used for crop production; however, as that land produces nothing during the time it is fallowed, its overall production is generally lower than if it were continuously in production. In times when grain prices are particularly high relative to production costs, there is an economic advantage to reducing the frequency of summerfallowing. Policies which increase the farm gate price of grain may thus serve to foster soil conservation through reducing the incentive to summerfallow.

To date, there has been no analysis of the extent to which prairie producers have historically responded to increased profitability of grain by reducing summerfallow use. The chief research in this area has been simulated

examinations of the relative economics of different crop rotations with different price and yield assumptions at the farm level. Some of these farm simulation studies have determined that, given current grain yields and prices, the amount of summerfallow use in specific areas is economically optimal.[1] In other analyses in other regions of the prairies, it has been concluded that producers would benefit economically from reducing the frequency of summerfallowing. While these simulations do provide insights into the factors which could motivate a decline in summerfallow, there may, in fact, be other overriding considerations. It has been observed, for instance, that there can be a significant difference in actual summerfallow use between provinces even where the soil, climate and price conditions have been very similiar[2]. This does not infer that the farm level studies which simulate the relative economics of different rotations are not relevant in predicting summerfallow use. There is a significant possibility, however, that there are other factors, such as the ability of provincial extension agents to disseminate technical information concerning the possibility of reducing summerfallow use. All such factors must be considered when predicting how particular regions will respond to different price signals[3].

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1 Refer in particular to work by R.P. Zentner and L.M. Johnson on the economics of crop rotations on the prairies published in Volume 13, Nos. 5 and 6, Volume 14, Nos. 4 and 6 of "Canadian Farm Economics", and Volume 32, No. 1 of the "Canadian Journal of Agriculture Economics".

2 Les MacCartney, "Prairie Summerfallow Intensity: An Analysis of 1981 Data", upcoming Statistics Canada working paper.

3 There may, in fact, be instances where producers actually behave in a fashion which is contrary to what would be predicted by farm simulation studies. For instance, when prices are depressed, the economic advantage of summerfallow may decline, but producers may reduce fallowing just to maintain their cash flow.

In addition to price, a second major consideration on how prairie grain markets impact on production methods is the volume of grain which is ultimately marketed. If marketings fall below production, the resultant stock accumulation may prove to be a disincentive to produce grain in subsequent years. Although many producers will accept some level of stock accumulation, the associated storage costs reduce the revenue received and also raise concerns about the future ability to market grain. If stocks reach certain critical levels, the disincentive to produce may manifest itself in an increased use of summerfallow. Unfortunately, there does not appear to have been much research to date on the level of actual farm responses to increased stock levels.

Given that increased prices and increased marketings may stimulate a reduction in summerfallow use, it is possible to speculate on how different policies which affect the marketing of prairie grain may impact on crop production practices. This paper will first examine those policies related to transport, feedgrains and the activities of the Canadian Wheat Board which do influence the grain market. Following those policies will be a discussion of others which do not necessarily affect the grain market, but are relevant to the area of soil conservation.

1. <u>Grain Transport Policy</u>:

Grain transport policy impacts on the grain market through influencing both the price received by farmers for grain, and the capacity of the transport system to deliver grain to the international market. Under the Crow's Nest rate structure, transport costs for certain grains were much lower than they would have been if the railways had received full compensation for the costs associated with shipping grain. As the price

of grain is determined on the international market, the price received by prairie farmers is the price paid by the ultimate consumer minus the costs associated with delivering the grain. Those grains which enjoyed reduced transport costs therefore necessarily experienced a higher return than if their transport rates fully reflected the costs. While these farm level prices may have been higher, the capacity of the system to handle grain may have been less, as there has been little incentive for the railways to upgrade their grain transport and handling facilities.

With the enactment of the Western Grain Transportation Act (WGTA) of 1983, the Crow's Nest rate structure was revised. Under that legislation, the railways are to receive payments from the government to compensate them for the loss incurred in shipping grain, while the share of the costs to be paid by producers through increased freight rates is also to increase over time. It is difficult to predict the actual future impacts of this legislation on the prairie agricultural sector as this will depend to a large extent on the international grain market. Research conducted by Agriculture Canada makes certain assumptions concerning the international market for grains, and predicts that:

> "although increasing the freight rates will reduce the income per tonne received from marketing grain relative to keeping the Crow, total grain income will increase due to greater production and volumes marketed and from reduced storage, handling and interest costs in response to a more efficient and higher throughput handling and transport system."[1]

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1 Agriculture Canada, "Agricultural Impacts of Crow Change: Final Report" (1983), p. 7

The impact of the Western Grain Transportation Act on soil conservation will be evident on its effect on cropping activity, the crop mix produced, and the relative proportion of grain to livestock. Concerning the impacts of cropping activity, if producers are motivated to increase the volume of grain through placing more land under production, this may result in the breaking of marginal areas which are more susceptible to erosion, thus increasing soil degradation. If, on the other hand, producers increase grain volumes through less use of summerfallow, then the net effect of the Western Grain Transportation Act will be positive. There is a definite need for research to be conducted on the extent to which expansion of the grain production would be accomodated by reduced summerfallow as opposed to placing of more land in production[1].

With respect to the crop mix, as most minor crops did not benefit from reduced transport rates under the Crow agreement, the abandonment of that policy will increase their attractiveness. Some of these crops, particularly those that increase the nitrogen content of the soil, can increase the number of years in which land can be used to produce crops before it must be summerfallowed (i.e., the rotation is "lengthened"). This could potentially have a beneficial effect on soil conservation.

A third aspect of transport policy is the proportion of livestock to crops produced on the prairies. As discussed previously, increases in livestock production are usually associated with devoting more land to pasture and forage production, and having more manure to apply to the

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1 Some initial work in this area can be found in the publication by the Canada Grains Council, "Prospects for the Prairie Grain Industry, 1990".

land. These features will have a beneficial effect on soil conservation. Studies by Agriculture Canada indicate that, by decreasing the prairie price of feedgrains, the abandonment of the Crow rate should serve to stimulate both the hog and cattle industries[1]. (It is possible that, in fact, there could be an even greater stimulus to livestock production if government compensation payments had gone to producers, and they, in turn, had been required to pay full compensatory rates to the railroads. This would have served to decrease grain prices even further, reducing the profitability of grain production and increasing that for livestock.) Much of the actual effects will, of course, be heavily influenced by the export prospects and general demand conditions for red meats and grains, but transport policy should exert some impact.

In conclusion, the abandonment of the Crow's Nest rates policy may have a positive effect on soil conservation to the extent that it stimulates the reduced use of summerfallow, increases the economic incentive to grow specialty crops and may also increase the relative importance of livestock to grain production. It is possible that the effects of this abandonment could have been made more pronounced if compensation had been paid to producers and if they, in turn, had been required to pay a greater proportion of the costs incurred in shipping grain to the export market. Given the significance of this policy change on the prairie feedgrains market, it would be instructive to focus more analysis on the possible effects of different options on the production practices in that region.

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1 B. Davey and B. Kirk, "The Effects of Bill C-155 on Canadian Livestock Production", Food Market Commentary, March 1984, p. 20.

2. Feedgrains Policy:

Feedgrains policy influences the prices and volume of prairie grain marketed through corn formula pricing and Feed Freight Assistance (F.F.A.). Corn formula pricing effectively imposes a ceiling on the price of western feedgrains sold in eastern Canada by having the Canadian Wheat Board guarantee that it will sell grain to that region at a price level related to the price of corn and soybeans. Analyses of the impact of this pricing policy indicate that it has had very little effect on the actual prices received by western grain producers.

Feed Freight Assistance presently subsidizes an average of 20 percent of the cost of shipping feedgrains from Thunder Bay to the Atlantic provinces and eastern Quebec, and from the prairies to certain areas of British Columbia. Currently, about 3 to 4 percent of prairie feedgrains (about one million tonnes) is affected by F.F.A., and that volume has been declining over time. It is very difficult to determine whether this policy has any significant impact on either the cropping practices persued on the prairies, or the crop to livestock mix. It does appear that other factors related to the international markets for grain and livestock are substantially more significant. As a consequence, it is dubious that either aspect of feedgrains policy has any discernible impact on the prairie agricultural sector or soil conservation.

3. Trade Policy:

Two elements of Canada's trade policy which contribute to the overall demand for western grain are food aid policy and export credit policy. By influencing demand, these policies have some impact on the prices and volumes of grain exported, and therefore on the use of prairie soil and water resources.

Food aid was valued at $32m in 1983/84, of which 85% was spent on Canadian procurement, the great majority being for wheat and wheat flour. Under the International Food Aid Convention, Canada undertakes to provide a minimum of 600,000 tonnes of cereals per year. In 1982/83 Canada gave 623,000 tonnes of wheat, 94,000 tonnes of wheat flour, and 2,000 tonnes of corn, - or about 2% of total 1983 grain and grain products exports of 29m tonnes.

The second program of concern under trade policy is the Grains Export Credit. The Canadian Wheat Board (CWB) is empowered to finance sales of western grain on credit terms of 3 years or less, at commercial rates of interest. The funds are provided by the Canadian chartered banks, under lines of credit to the banks which are guaranteed by the Minister of Finance. The list of countries eligible to purchase grain on credit terms, and the credit ceiling applicable to individual countries are reviewed annually by Cabinet. This program permits the CWB to meet the competition of other exporters, particularly for certain middle-income countries like Brazil and in North Africa. Up to one-third of Canadian wheat sales in recent years have been on the basis of Government-guaranteed credit. In the absence of the program, our average sales volumes and prices would undoubtedly have been less, though it is difficult to precisely quantify the reduction.

It may be concluded that both these programs may serve to stimulate the demand for grain, and that by stimulating grain production, summerfallow use can be reduced so long as the grain market is not so favourable as to cause more marginal land to be placed in production. Further research will be required to obtain an actual estimate of the impact of these policies on the grain market before it is possible to determine their influence on soil conservation and degradation.

4. Grain Marketing Quotas:

The present Canadian Wheat Board quota marketing policy, as determined by the Wheat Board Act, has received considerable criticism for contributing to increased summerfallowing; however, it is not clear that any other method of distributing "marketing rights" would necessarily improve land utilization.

Currently, a producer is granted rights to market a certain number of bushels for each acre of land which is considered to be "potentially cultivable". This includes land currently in crop production, summerfallow or improved land used for producing tame hay. In addition to this area, the Wheat Board has recently been granting "bonus acres" which are the difference between one third of the area of cultivable land and the total land in summerfallow and special crops. Despite the recent "bonus acres" programs, there is still an economic advantage to break land in order to obtain rights to market a greater volume of grain. It is not clear how much land has historically been broken simply to acquire quota rights, whether any changes in quota policy could reduce any such land clearing in the future, or even if policy changes could motivate producers to return certain marginal land to pasture. More research in this area would be very beneficial in assessing the impact of quota policy on soil conservation.

Quota policy has received considerable criticism for not allocating marketing rights according to the productivity of the land in different regions. The current quota policy permits one to sell a specific number of bushels per acre regardless of actual yields. Most criticism of this constant quota focuses on the misallocation of resources within the prairies which this causes for the grains industry as a whole; however, it also has certain regional impacts on soil degradation. Areas which have higher rainfall values generally are those in which there is the greater potential for continuous cropping, as summerfallowing is not required to the same extent. Due to the fact that such regions generally enjoy higher yields, the constant quota system reduces the proportion of the crop which can be sold there, in comparison with the proportion sold in the more marginal areas. The current quota policy may thus be perceived as creating the least incentive to reduce summerfallow in the areas which would be best able to do so. Research should be focussed on the means by which quota policy could be altered to encourage reduced summerfallowing, particularly in areas where moisture levels allow farmers to adopt this strategy.

There appears to be general agreement within the industry that quotas can encourage summerfallow, but there are few specific suggestions as to how to alter quota policy so as to negate this effect. No matter how marketing rights are distributed, it is inevitable that the existance of carryover stocks will necessarily encourage more summerfallow use.

It is possible that the Wheat Board Act and related agricultural policy could be altered to better encourage the adoption of soil conservation practices. Policies which could be considered are:

1. Continue to price Canadian grain on the international market so as to increase marketings and reduce the incentive to summerfallow.

2. Do not grant any more quota for land broken for crop use, so as to encourage more intensive use of the existing land base.

3. Continue the "bonus acres" program of awarding extra acreage to those whose area in summerfallow and specialty crops is less than one third of their total acreage.

4. If possible, alter the above scheme so as to award bonus acres to those whose summerfallow acreage alone is less than one third the total.

5. Initiate a study into the administrative feasibility of awarding quota solely on the basis of seeded acreage. This would reduce any incentive to summerfallow simply to acquire "marketing rights". Such a program could be considerably more difficult to administer, however, as it is difficult to verify the actual seeded acreage for each individual.

6. Initiate studies into the feasibility of varying the amount of quota per acre according to the productivity within a particular area.

7. Give extra marketing credits to those who incorporate forages or legumes in rotation with grains. One method of doing this is to give full or partial credit for all acres planted over to such crops, and give none for summerfallow. This proposal also would be difficult to administer as the acreages of each crop would have to be verified for each producer.

8. Give extra marketing credits to those who apply soil conserving methods such as strip cropping, contour plowing, snow trapping etc. It may be possible to give a higher quota of bushels per acre to land farmed in this fashion. This program may be difficult to administer as it would require verification of the acreage in which conservation techniques are applied, and also increase the complexity of the system.

9. Continue to study possible methods of reducing the economic hardships which are associated with carryover stocks, as such stocks can act as an incentive to reduce future production through summerfallowing. Current proposals being studied by a special advisory committee of the Wheat Board in this regard include the granting of advance payments for on-farm stocks through the Western Grain Stabilization fund, or extending loans up to a certain proportion of the stock's value.

10. Abandon the current quota policy altogether and have producers contract their deliveries to the Wheat Board prior to planting. This would be similar to the current program used to encourage new

varieties. It may be desirable, in fact, to retain the present system of marketing a certain volume per acre, but contracting any amounts in excess of the initial quota. By reducing the significance of quota policy in the marketing of grain, there would be less emphasis on the need to clear land in order to obtain "marketing rights".

11. Although not related to the quota policy of the Canadian Wheat Board "per se", it is important to recognise the need to develop markets for specialty crops not currently marketed by the Wheat Board. Such specialty crops often facilitate the extension of crop rotations by both providing nitrogen to the soil, and by reducing the problems of disease and pests which are associated with monoculture. They also may reduce the problem of carryover stocks in grains by producing products which may be more marketable.

5. Credit Policy:

The government's credit policy towards agriculture may be considered to be either loans advanced directly by the Government through an agency such as the Farm Credit Corporation (F.C.C.), or through the offering of loan guarantees to other financial intermediaries through programs such as the Farm Improvement Loans Act (F.I.L.A.). The current activities of both of these agencies have been relatively neutral towards actual cropping practices and thus have had little impact on soil conservation.

F.I.L.A. does have provision through Section 5 of its Act to guarantee loans for activities which facilitate soil conservation; however, the greatest activity of F.I.L.A. has been in backing loans for large machinery such as tractors and combines. In 1982, less than four percent of all loans in the prairie provinces involved anything to do with land development and very little of that would conceivably have been used in soil conservation measures.[1]

There is some potential for both F.C.C. and F.I.L.A. to become more actively involved in encouraging soil and moisture conservation. F.I.L.A. could place a greater emphasis in its publications on the extent to which its credit can be used for conservation purposes. F.C.C. administrators could encourage applicants to incorporate more soil and water conservation provisions in the farm plans which they submit before obtaining loans, and it could also give preferential loans to equipment used for soil conservation. In all cases, facilitating the adoption of conservation measures must be done according to the needs and the abilities of the individual applicants. It would be counter-productive if standard conservation criteria were applied to all applicants.

It should be recognised that credit is just one component of an overall effort at the farm level to facilitate conservation. Conceivably, a "package" should be developed for those wishing to adopt conservation measures which would include credit, but also have components involving management advice, soil testing and analysis, extension etc. It should be emphasized that if the government is to become involved in actively

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1 Annual Report 1982, Farm Improvements Loans Act.

promoting conservation through changing production practices, it should also ensure that those participating are fully capable of demonstrating the level of management required for it to be successful. There is considerable risk that simply advocating summerfallow or minimum tillage without providing the necessary management advice would cause difficulties that would jeopardize the government's initiative in this area.

6. Tax Policy:

Land taxes may reduce the incentive for land clearing by charging more for cropland than land left in pasture. Income taxes may influence the relative economics of producing crops as opposed to livestock, and thus indirectly influence how much land is left in pasture and how much is cleared. Capital gains taxes reduce the actual value received for land by farmers and thus potentially could reduce the incentive to maintain its productivity. In virtually all cases, the influence of taxation on land use is highly speculative and there has been little research in this area.

Possible recommendations as to how taxation policy could foster more conservation include:

1. Municipalities should ensure that taxpayers clearing land are fully familiar with the extent to which this will increase their land taxes.

2. Tax concessions, either for land taxes or income taxes, could be granted for those adopting certain conservation methods where they are needed. In the case of income tax, the extra expenses associated

with conservation could be entered as an expense on the "Statement of Income and Expenses" form. The problem with this proposal is the administrative difficulty in properly assessing individual soil conservation efforts. It is also important that those adopting these methods be fully familiar with the required techniques to ensure that their efforts have a positive impact.

3. Capital depreciation allowances and investment tax credits should be devised so as to give an increased incentive to purchase equipment which encourages soil conservation, such as that used for minimum tillage, for those who can use such equipment.

4. Income tax policy should not be perceived as favouring crop rather than livestock production, as this could encourage the clearing of pasture land.

5. Capital gains tax should be administered so as not to penalize those who maintain a higher value of land through better conservation methods.[1]

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1 Before any action is taken on this recommendation, it would be important to ensure that land values would indeed reflect better any conservation practices which are used. Currently, many other factors appear to be more important in determining land prices.

7. Stabilization/Crop Insurance:

Crop insurance and income stabilization policies can enhance soil conservation by ensuring the cash flow required to adopt more progressive farming techniques and reducing risks inherant in many practices. There are a few features of the actual programs themselves, however, which could be improved to better foster such practices. Currently, the Alberta and Saskatchewan crop insurance programs offer substantially better coverage for land which was previously summerfallowed compared with that which had a crop grown on it the previous year. In the area of income stabilization, the Western Grains Stabilization Act (W.G.S.A.) offers coverage for only specific grains, and may enhance the economic incentive to grow grain rather than specialty crops or livestock.

In order to address some of the above difficulties, the following measures are proposed:

1. In assessing the amount of crop insurance to award a producer growing crop on land not previously summerfallowed, a distinction should be made between those who adopt proper snow trapping and moisture conserving techniques and those who do not. (Currently, the only method used in evaluating a producer's management techniques is the extent of the claims he has historically made against the program.)

2. If a distinction is to be made between the amount that can be insured for land which was previously cropped, with that which had been fallowed, the difference should reflect current technology. Recent

developments in moisture conservation may make it possible for better managers to realize yields for land which had a previous crop on it which are closer to those for summerfallowed land than what is recognized in the crop insurance program.

3. Charge higher crop insurance premiums to those planting in fallow, as the extra erosion which they cause will ultimately increase the cost of the program to all participants.

4. Offer increased benefits for those who reduce summerfallow in areas where it is determined that such a practice will combat saline seeps which lead to soil salinization.

5. Offer increased benefits for those growing winter wheat or specialty crops which foster soil conservation.

6. Develop income assurance schemes similar to W.G.S.A. for all crops, particularly those of a legumous variety which facilitate the lengthening of crop rotations.

7. Ensure that stabilization benefits to livestock producers under the Agricultural Stabilization Act (A S.A.) are equal or superior to grain producers under W.G.S.A.

8. Introduce a comprehensive system of income assurance which does not distinguish between livestock and grain production, but total

receipts from the sale of all agricultural commodities. This will reduce any favouritism to feedgrain production which may be perceived under the current system.

9. If alterations are made to W.G.S.A., retain the freedom for the producer to select among grain varieties so that he may choose that which is best for his particular soil conditions.

8. Energy Conservation Policy:

The policy of encouraging energy conservation is generally consistent with that of conserving the soil. Both minimum tillage and reduced summerfallow reduce the amount of energy required per unit of output directly by diminishing the amount of mechanical energy required for a particular production level. Over the long run, they also may reduce the amount of energy required in the form of fertilizer due to less nutrient loss through erosion. (In the short run, however, minimum tillage may increase fertilizer requirements due to increased microbral denitrification.)

Another example of a practice which is consistent for both soil and energy conservation is the growing of a "vetch" crop in the fall and plowing it under in the spring to provide nitrogen. Although this practice is only feasible in the areas of the prairies with more precipitation, it does provide a ground cover for the critical time in the spring when wind erosion problems are most prevalent.

CONCLUSIONS AND NEEDS FOR FUTURE RESEARCH

There are inadequate research results to date to make definitive statements concerning the impact of most policies on soil degradation in the prairies. The first difficulty is the lack of extensive research on the impact on soil degradation of production practices such as reduced summerfallow and minimum tillage. Although there appears to be a concensus that these measures are beneficial for soil conservation, quantitative estimates of their impacts are not known for most prairie conditions. The second difficulty is that very little analysis has focussed on the impact of government policies on such practices. Much of this paper has attempted to demonstrate some of the conceptual framework which will be necessary for further research in this area. It is imperative that further resources be committed to make it possible to formulate detailed recommendations concerning measures which can enhance conservation.

From what is currently available it is possible to advance the following conclusions:

1. While it may be possible to create the conditions required for producers to reduce their summerfallow use, and increase minimum tillage, it is imperative that the necessary technology be developed and disseminated so as to effect the desired response. Either reducing summerfallow or tillage can increase the risk of crop failure unless such measures are done properly; thus, producers may be reluctant to respond as desired to changes in policy unless they are certain that they do not place their operations in jeopardy.

2. One of the most important factors governing the extent of summerfallow use which can be influenced by government policy is the price and volume of grains sold. Improvements in transportation and handling facilities which result from the Western Grain Transportation Act will most likely have a beneficial impact in increasing the intensity of land use, although the international market for grain will be the most important factor.

3. Soil conservation could be served by facilitating an increase in the production of specialty crops. Such crops make it possible to increase the proportion of time that land can be kept in production before it has to be summerfallowed. Any improvement of the marketing and transportation for such crops could be beneficial to soil conservation.

4. Feedgrains policy does not appear to have the potential for significantly influencing cultural practices on the prairies.

5. It is possible that the quota policy for marketing grains can encourage producers to break marginal land in order to obtain the marketing rights required to market grain. There are a number of possible alterations to this policy which could mitigate this effect. Examples of such alterations include the continuation of the current "bonus" acres program, the allocation of quota only on the basis of seeded acres, the awarding of quota on the basis of the productivity of the land and also introducing a moratorium on further granting of quota rights to those breaking land until the current land base is producing at most of its capacity.

6. Research the administrative feasibility of awarding marketing rights to those adopting improved soil management activities.

7. Research should be done on the feasibility of introducing alternatives to the quota system which would allocate marketing rights without encouraging the use of land that would be better not to place in crop production.

8. Provide marketing facilities which will encourage the growing of specialty crops that enhance soil conservation.

9. Credit policy could be changed somewhat to require applicants for government assisted credit with potential degradation problems on their farms to demonstrate efforts to preserve their soil resource. It will be necessary for such conservation to be encouraged by individual credit administrators. It would be adviseable to include credit in an overall "package" of conservation improvement.

10. It would probably be adminstratively difficult to develop tax measures which encourage proper soil conservation for each individual set of circumstances. Aside from giving tax credits on machinery and equipment which is specifically designed to conserve soil, this policy instrument will probably be of limited usefulness.

11. The policy of soil and moisture conservation is, to a large extent, quite consistent with current government policy to encourage energy conservation.

12. Crop insurance could potentially be used to reduce the risk inherant in continuous cropping.

13. Stabilization programs for livestock and specialty crops should be as attractive to producers as those that currently exist for grains so as to encourage more diversification of prairie agriculture.